AiP74LVT/LVTH2245
Octal Bus Transceiver with Termination Resistors; 3-state

Product Specification

Specification Revision History：

Version	Date	Description
2017-02-A1	2017-02	New
2023-04-B1	2023-04	Update the template

Contents

1、General Description

This device is an octal transceiver featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The control function implementation minimizes external timing requirements. The device features an output enable input ($\overline{OE}$) for easy cascading and a direction input (DIR) for direction control.

The AiP74LVT/LVTH2245 is designed with series resistance in both the HIGH state and LOW-state of the output. This design reduces line noise in applications such as memory address drivers, clock drivers and bus transceivers and transmitters.

Features:

- 30Ω output termination resistors
- Octal bidirectional bus interface
- 3-state buffers
- Output capability: +12mA and -12mA
- TTL input and output switching levels
- Input and output interface capability to systems at 5V supply
- Bus hold data inputs eliminate need for external pull-up resistors to hold unused inputs
- Live insertion and extraction permitted
- Power-up 3-state
- No bus current loading when output is tied to 5V bus
- Specified from -40℃ to +125℃
- Packaging information:SOP20/TSSOP20

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74LVT2245 SA20.TB	SOP20	74LVT2245	35 PCS/tube	80 tube/box	2800 PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing: 1.27mm
AiP74LVTH2245 SA20.TB	SOP20	74LVTH2245	35 PCS/tube	80 tube/box	2800 PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing: 1.27mm
AiP74LVT2245 TA20.TB	TSSOP20	74LVT2245	70 PCS/tube	200 tube/box	14000 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm
AiP74LVTH2245 TA20.TB	TSSOP20	74LVTH2245	70 PCS/tube	200 tube/box	14000 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LVT2245 SA20.TR	SOP20	74LVT2245	2000PCS/reel	2000PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing:1.27mm
AiP74LVTH2245 SA20.TR	SOP20	74LVTH2245	2000PCS/reel	2000PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing:1.27mm
AiP74LVT2245 TA20.TR	TSSOP20	74LVT2245	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing:0.65mm
AiP74LVTH2245 TA20.TR	TSSOP20	74LVTH2245	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing:0.65mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

2、Block Diagram And Pin Description

2.1、Block Diagram

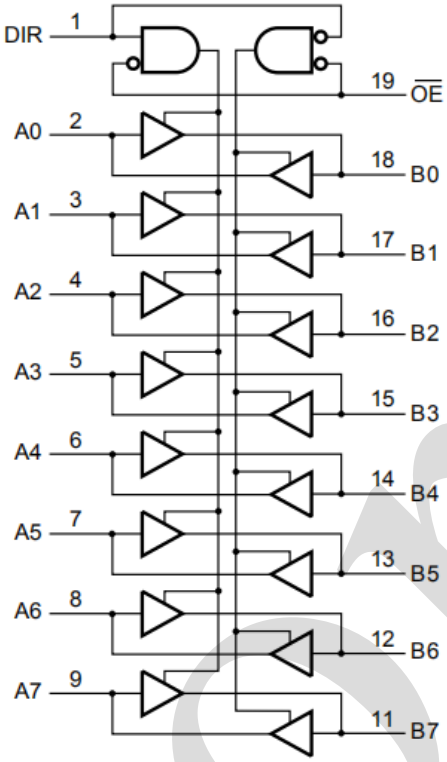


Figure 1. Logic symbol

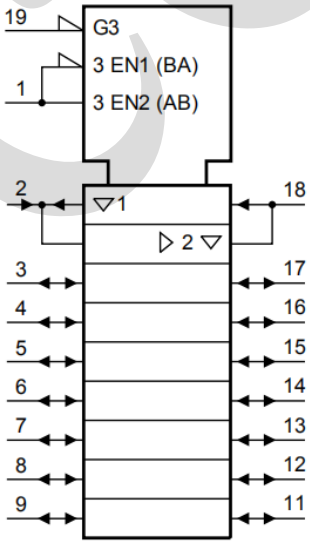
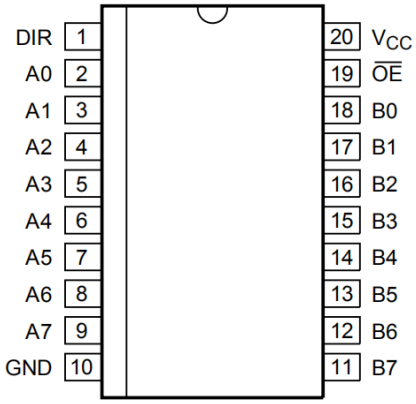
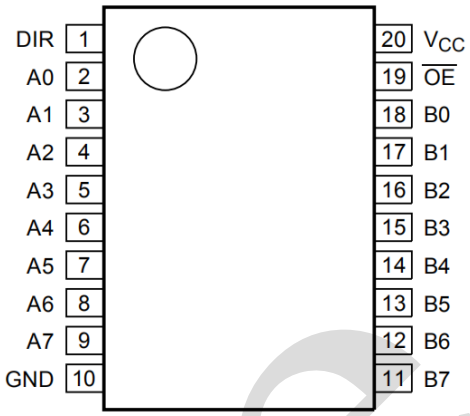


Figure 2. IEC logic symbol

2.2、Pin Configurations



SOP20



TSSOP20

2.3、Pin Description

Pin No.	Pin Name	Description
1	DIR	direction control input
2,3,4,5,6,7,8,9	A0~A7	data input/output
10	GND	ground (0V)
18,17,16,15,14,13,12,11	B0~B7	data input/output
19	$\overline{OE}$	output enable input
20	V_{CC}	supply voltage

2.4、Function Table

Control		Input/output	
n$\overline{OE}$	**DIR**	**An**	**Bn**
L	L	output An=Bn	input
L	H	input	output Bn=An
H	X	Z	Z

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state.

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+4.6	V
input voltage	V_I	-[1]	-0.5	+7.0	V
output voltage	V_O	output in OFF-state or HIGH-state[1]	-0.5	+7.0	V
input clamping current	I_{IK}	V_I<0V	-50	-	mA
output clamping current	I_{OK}	V_O<0V	-50	-	mA
output current	I_O	output in LOW-state	-	128	mA
		output in HIGH-state	-64	-	mA
storage temperature	T_{stg}	-	-65	+150	℃
junction temperature	T_j	-[2]	-	150	℃
total power dissipation	P_{tot}	-	-	500	mW
Soldering temperature	T_L	10s	260		℃

Note:

[1] The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	2.7	-	3.6	V
input voltage	V_I	-	0	-	5.5	V
HIGH-level output current	I_{OH}	-	-12	-	-	mA
LOW-level output current	I_{OL}	-	-	-	12	mA
input transition rise and fall rate	$\Delta t/\Delta V$	outputs enabled	-	-	10	ns/V
ambient temperature	T_{amb}	in free air	-40	+25	+125	℃

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ. [1]	Max.	Unit
input clamping voltage	V_{IK}	V_{CC}=2.7V;I_{IK}=-18mA		-1.2	-0.9	-	V
HIGH-level input voltage	V_{IH}	-		2.0	-	-	V
LOW-level input voltage	V_{IL}	-		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_{CC}=3.0V;I_{OH}=-12mA		2.0	2.2	-	V
LOW-level output voltage	V_{OL}	V_{CC}=3.0V;I_{OL}=12mA		-	-	0.8	V
input leakage current	I_I	control pins	V_{CC}=0V or 3.6V;V_I=5.5V	-	-	10	uA
			V_{CC}=3.6V; V_I=V_{CC} or GND	-	-	±1	uA
		I/O data pins; V_{CC}=3.6V [2]	V_I=5.5V	-	-	20	uA
			V_I= V_{CC}	-	-	1	uA
			V_I=0V	-	-	-5	uA
power-off leakage current	I_{OFF}	V_{CC}=0V; V_I or V_O=0V to 4.5V		-	-	±100	uA
bus hold LOW current	I_{BHL}	V_{CC}=3V; V_I=0.8V		75	150	-	uA
bus hold HIGH current	I_{BHH}	V_{CC}=3V; V_I=2.0V		-	-150	-75	uA
bus hold LOW overdrive current	I_{BHLO}	V_{CC}=0V to 3.6V;V_I=3.6V [3]		-	-	500	uA
bus hold HIGH overdrive current	I_{BHHO}	V_{CC}=0V to 3.6V;V_I=3.6V [3]		-500	-	-	uA
output high leakage current	I_{CEX}	output in HIGH-state when V_O>V_{CC}; V_O=5.5V; V_{CC}=3.0V		-	-	125	uA
power-up/ power-down output current	$I_{O(pu/pd)}$	V_{CC}≤1.2V; V_O=0.5V to V_{CC}; V_I=GND or V_{CC}; n$\overline{OE}$ = don't care[4]		-	-	±100	uA
supply current	I_{CC}	V_{CC}=3.6V; V_I=GND or V_{CC}; I_O=0A	output HIGH	-	-	0.19	mA
			output LOW	-	-	0.19	mA
			outputs disabled[5]	-	-	0.19	mA

additional supply current	ΔI_{CC}	per input pin;V_{CC}=3.0V to 3.6V;one input at V_{CC}-0.6V, other inputs at V_{CC} or GND[6]	-	-	0.2	mA
input capacitance	C_I	DIR and $\overline{OE}$;V_I=0V or 3.0V	-	4	-	pF
input/output capacitance	$C_{I/O}$	An and Bn;outputs disabled; $V_{I/O}$=0V or 3.0V	-	10	-	pF

Note:

[1] Typical values are measured at V_{CC}=3.3V and at T_{amb}=25℃.

[2] Unused pins at V_{CC} or GND.

[3] This is the bus hold overdrive current required to force the input to the opposite logic state.

[4] This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10ms. From V_{CC}=1.2V to V_{CC}=3.0V to 3.6V a transition time of 100us is permitted.

[5] I_{CC} is measured with outputs pulled to V_{CC} or GND.

[6] This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

3.3.2、DC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ. [1]	Max.	Unit
input clamping voltage	V_{IK}	V_{CC}=2.7V;I_{IK}=-18mA		-1.2	-	-	V
HIGH-level input voltage	V_{IH}	-		2.0	-	-	V
LOW-level input voltage	V_{IL}	-		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_{CC}=3.0V;I_{OH}=-12mA		2.0	-	-	V
LOW-level output voltage	V_{OL}	V_{CC}=3.0V;I_{OL}=12mA		-	-	0.8	V
input leakage current	I_I	control pins	V_{CC}=0V or 3.6V;V_I=5.5V	-	-	10	uA
			V_{CC}=3.6V; V_I=V_{CC} or GND	-	-	±1	uA
		I/O data pins; V_{CC}=3.6V [2]	V_I=5.5V	-	-	20	uA
			V_I= V_{CC}	-	-	1	uA
			V_I=0V	-	-	-5	uA
power-off leakage current	I_{OFF}	V_{CC}=0V; V_I or V_O=0V to 4.5V		-	-	±100	uA
bus hold LOW current	I_{BHL}	V_{CC}=3V; V_I=0.8V		75	-	-	uA
bus hold HIGH current	I_{BHH}	V_{CC}=3V; V_I=2.0V		-	-	-75	uA

bus hold LOW overdrive current	I_{BHLO}	V_{CC}=0V to 3.6V;V_I=3.6V [3]	-	-	500	uA
bus hold HIGH overdrive current	I_{BHHO}	V_{CC}=0V to 3.6V;V_I=3.6V [3]	-500	-	-	uA
output high leakage current	I_{CEX}	output in HIGH-state when V_O>V_{CC}; V_O=5.5V; V_{CC}=3.0V	-	-	125	uA
power-up/ power-down output current	$I_{O(pu/pd)}$	V_{CC}≤1.2V; V_O=0.5V to V_{CC}; V_I=GND or V_{CC}; n$\overline{OE}$ = don't care[4]	-	-	±100	uA
supply current	I_{CC}	V_{CC}=3.6V; V_I=GND or V_{CC}; I_O=0A; output HIGH	-	-	0.19	mA
		output LOW	-	-	0.19	mA
		outputs disabled[5]	-	-	0.19	mA
additional supply current	ΔI_{CC}	per input pin;V_{CC}=3.0V to 3.6V;one input at V_{CC}-0.6V, other inputs at V_{CC} or GND[6]	-	-	0.2	mA

Note:

[1] Typical values are measured at V_{CC}=3.3V and at T_{amb}=25℃.

[2] Unused pins at V_{CC} or GND.

[3] This is the bus hold overdrive current required to force the input to the opposite logic state.

[4] This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10ms. From V_{CC}=1.2V to V_{CC}=3.0V to 3.6V a transition time of 100us is permitted.

[5] I_{CC} is measured with outputs pulled to V_{CC} or GND.

[6] This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

3.3.3、AC Characteristics 1

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.[1]	Max.	Unit
LOW to HIGH propagation delay	t_{PLH}	An to Bn or Bn to An;see Figure 4	V_{CC}=2.7V	-	-	7.4	ns
			V_{CC}=3.0V to 3.6V	1.0	4.5	6.4	ns
HIGH to LOW propagation delay	t_{PHL}	An to Bn or Bn to An;see Figure 4	V_{CC}=2.7V	-	-	6.9	ns
			V_{CC}=3.0V to 3.6V	1.0	4.3	6.3	ns
OFF-state to HIGH propagation delay	t_{PZH}	see Figure 5	V_{CC}=2.7V	-	-	12.7	ns
			V_{CC}=3.0V to 3.6V	1.1	6.3	9.8	ns
OFF-state to LOW propagation delay	t_{PZL}	see Figure 5	V_{CC}=2.7V	-	-	10.6	ns
			V_{CC}=3.0V to 3.6V	1.5	6.0	9.1	ns
HIGH to OFF-state propagation delay	t_{PHZ}	see Figure 5	V_{CC}=2.7V	-	-	7.8	ns
			V_{CC}=3.0V to 3.6V	2.2	5.2	7.3	ns
LOW to OFF-state propagation delay	t_{PLZ}	see Figure 5	V_{CC}=2.7V	-	-	7.0	ns
			V_{CC}=3.0V to 3.6V	2.0	5.0	7.0	ns

Note:

[1] Typical values are measured at V_{CC}=3.3V and T_{amb}=25℃.

3.3.4、AC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

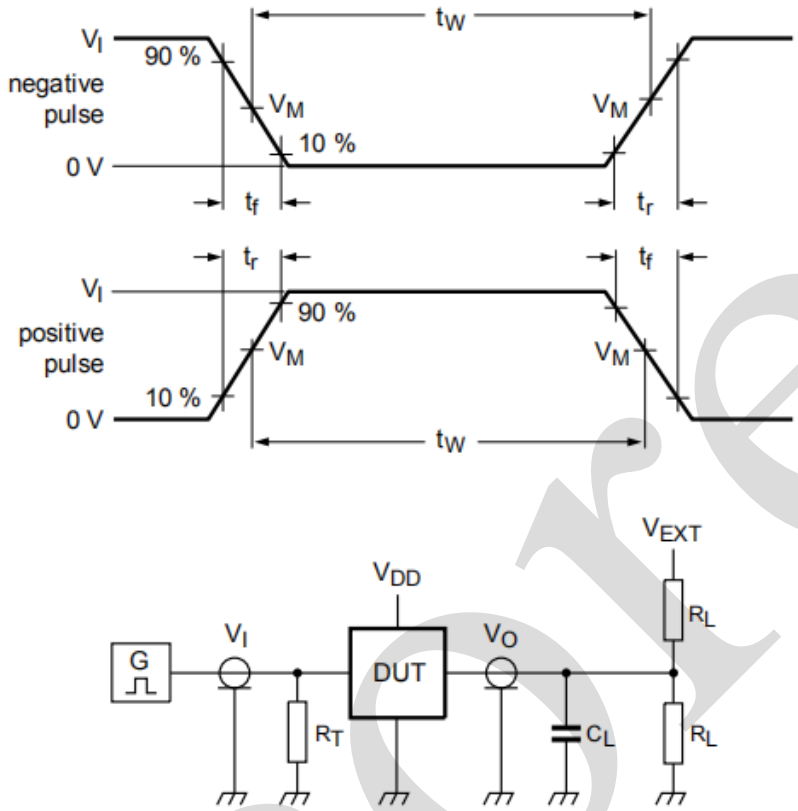
Parameter	Symbol	Conditions		Min.	Typ.[1]	Max.	Unit
LOW to HIGH propagation delay	t_{PLH}	An to Bn or Bn to An;see Figure 4	V_{CC}=2.7V	-	-	9.0	ns
			V_{CC}=3.0V to 3.6V	-	-	7.7	ns
HIGH to LOW propagation delay	t_{PHL}	An to Bn or Bn to An;see Figure 4	V_{CC}=2.7V	-	-	8.3	ns
			V_{CC}=3.0V to 3.6V	-	-	7.6	ns
OFF-state to HIGH propagation delay	t_{PZH}	see Figure 5	V_{CC}=2.7V	-	-	15.3	ns
			V_{CC}=3.0V to 3.6V	-	-	11.8	ns
OFF-state to LOW propagation delay	t_{PZL}	see Figure 5	V_{CC}=2.7V	-	-	12.7	ns
			V_{CC}=3.0V to 3.6V	-	-	10.9	ns
HIGH to OFF-state propagation delay	t_{PHZ}	see Figure 5	V_{CC}=2.7V	-	-	9.4	ns
			V_{CC}=3.0V to 3.6V	-	-	8.7	ns
LOW to OFF-state propagation delay	t_{PLZ}	see Figure 5	V_{CC}=2.7V	-	-	8.4	ns
			V_{CC}=3.0V to 3.6V	-	-	8.4	ns

Note:

[1] Typical values are measured at V_{CC}=3.3V and T_{amb}=25℃.

4、Testing Circuit

4.1、AC Testing Circuit



Definitions test circuit:

R_L=Load resistance.

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to output impedance Z_o of the pulse generator.

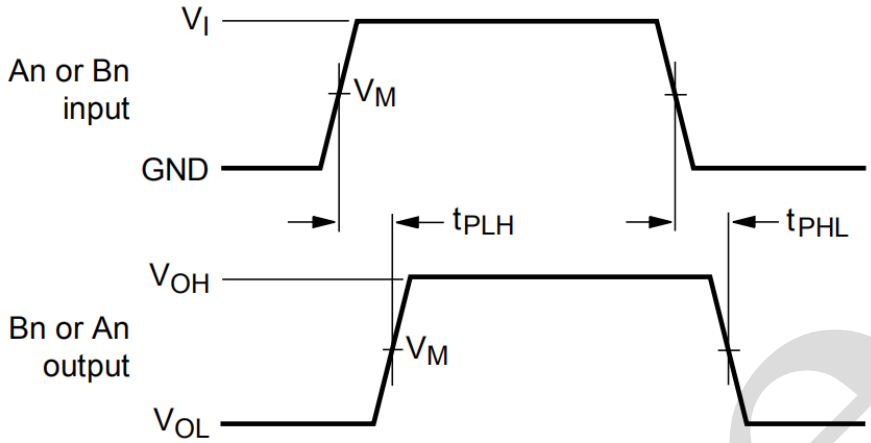
V_{EXT}=External voltage for measuring switching times.

Figure 3. Test circuit for measuring switching times

4.2、Test Data

Input				Load		V_{EXT}		
V_I	f_i	t_W	t_r , t_f	C_L	R_L	t_{PHZ}, t_{PZH}	t_{PLZ}, t_{PZL}	t_{PLH}, t_{PHL}
2.7V	≤10MHz	500ns	≤2.5ns	50pF	500Ω	GND	6V	open

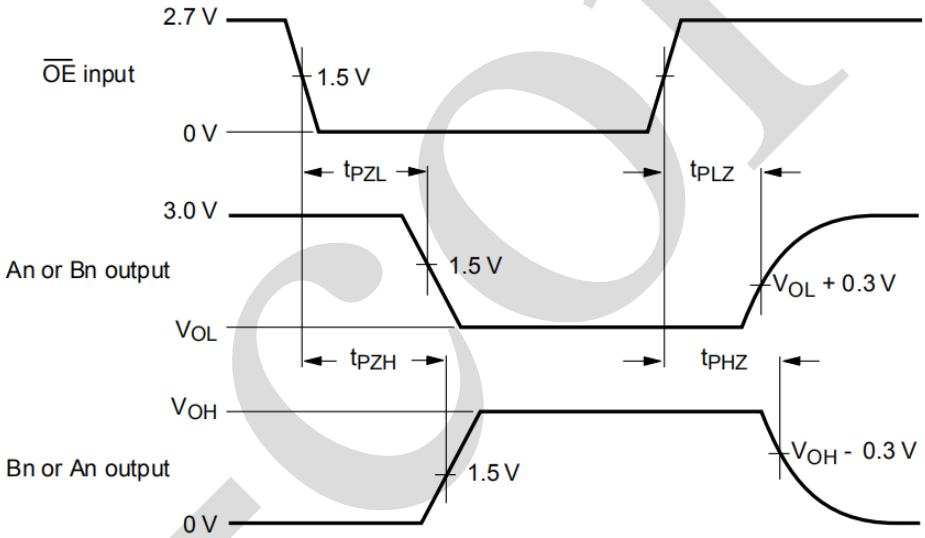
4.3、AC Testing Waveforms



V_M=1.5V

V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Figure 4. Input (An or Bn) to output (Bn or An) propagation delays

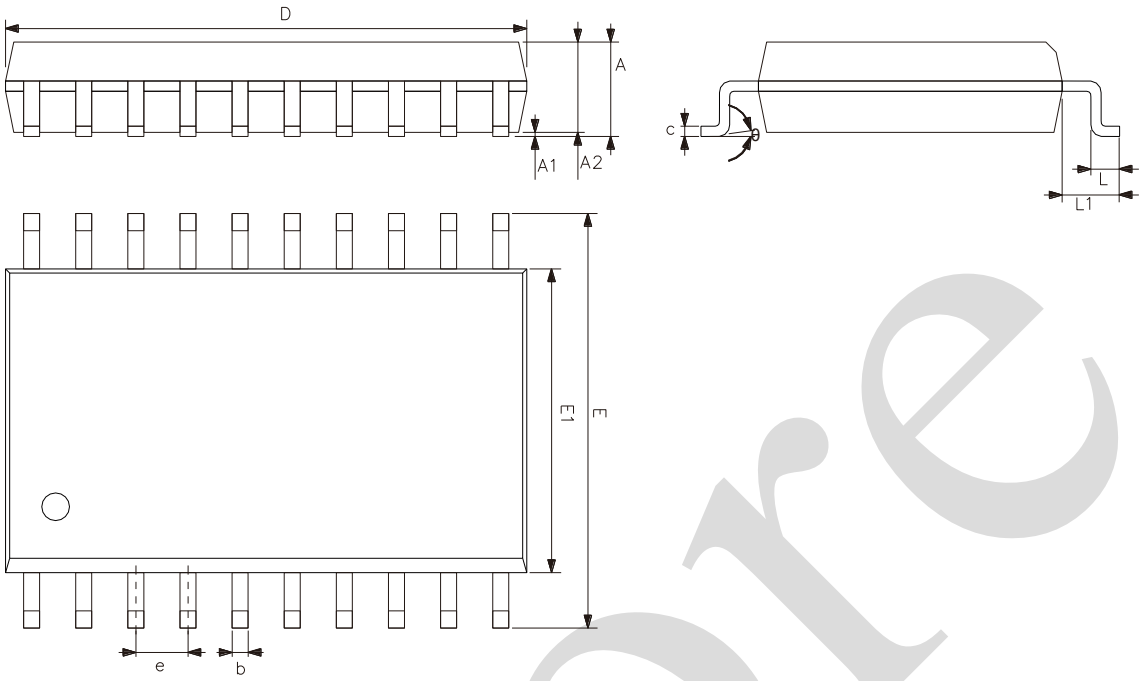


V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Figure 5. 3-state output enable and disable times

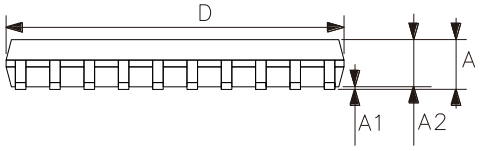
5、Package Information

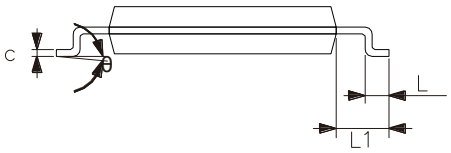
5.1、SOP20

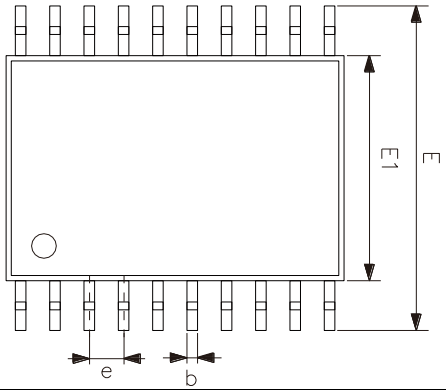


Symbol	Dimensions (mm)	
	Min.	Max.
A	2.47	2.65
A1	0.05	0.30
A2	2.20	2.44
b	0.35	0.50
c	0.15	0.30
D	12.54	12.94
E	10.00	10.60
E1	7.30	7.70
e	1.27	
L	0.40	1.05
L1	1.30	1.50
θ	0 °	8 °

5.2、TSSOP20







Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	6.40	6.60
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
θ	0°	8°

6、Statements And Notes

6.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○：Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

6.2、Notes

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